

Application Serial No.: 10/780,341
Attorney Docket No.: BUR920000061US1

RECEIVED
CENTRAL FAX CENTER
SEP 26 2006

REMARKS

Claims 19-38 are pending in the present application. Claims 19, 21, 22, 26-30, 33-35, 37 and 38 have been amended. Claims 31 and 36 have been canceled. Claims 1-18 were previously canceled.

Applicant respectfully requests reconsideration of the application in view of the foregoing amendments and the remarks appearing below, which Applicant believes places the application in condition for allowance.

Rejections Under 35 U.S.C. § 112

Claims 26-34 stand rejected under 35 U.S.C. § 112, first paragraph. The Office Action states the specification does not reasonably provide enablement for flowing an exhaust gas into a chamber to deposit an n-doped layer of silicon or using any carrier gas and any n-type dopant gas.

Applicant has amended claims 26, 27 and 30 to remove the "n-type" limitation in front of the occurrences of "dopant gas" and has amended claim 26 to remove the "silicon" limitation in clause (c).

Regarding the assertion that the application does not reasonably enable those of ordinary skill in the art to practice the claimed invention using gases other than silane and arsine, Applicant respectfully disagrees. Any industry implementing processes that produce exhausts containing two or more constituent gases knows the behaviors of these gases, understands whether or not they are amenable to deposit by chemical vapor deposition (CVD) and can readily obtain the necessary CVD parameters, if any, for these gases, usually from published data.

In addition, Applicant's specification provides support for "an exhaust gas of a manufacturing process, the exhaust gas comprising a carrier gas and a dopant gas," as recited in amended claim 26. The first paragraph of the "Background of the Invention" section of Applicant's application provides "[m]icroelectronic manufacturers utilize a number of different species of gas during the processing of wafers, which are fundamental to the manufacture semi- and superconductor devices." The microelectronics manufacturing process "involves flowing

Page 6 of 11

Law Offices of
Downs Rachlin Martin PLLC
199 Main Street, P.O. Box 190
Burlington, VT 05402-0190
(802) 863-2375

BEST AVAILABLE COPY

Application Serial No.: 10/780,341
Attorney Docket No.: BUR920000061US1

one or more gases into a processing chamber to effect the desired result.” Applicant’s background section further provides that it is desirable “to simultaneously flow a carrier gas, such as silane, and a doping gas, such as arsine, into the wafer processing chamber.” Thus, silane and arsine are provided only as examples. Applicant’s claimed invention is directed to scrubbing exhaust gases from a microelectronics manufacturing process. Exhaust gases include specific species of carrier gases and dopant gases that are well known in the art and have well known CVD and other properties. Accordingly, Applicant submits the specification provides sufficient support for the “exhaust gas comprising a carrier gas and a dopant gas” limitation to enable one of ordinary skill in the art to practice the claimed invention to a broad scope.

To back the assertion that carrier gases and dopant gases are indeed well known in the art, Applicant refers to the *Taylor*, *Aitchison*, and *Shiban* patents, all cited in the Office Action and all of which refer to various gases and combinations thereof routinely used in industry. For example, the *Taylor* patent provides, at Col. 1, ll. 8-14, “large quantities of noxious substances are employed in the semiconductor industry in the processing of electronic wafers/chips and other devices. These include a variety of compounds of Group 3, 4, and 5(b) elements of the Periodic Table and in particular hydrides of such elements in an exhaust stream, may include silane, phosphine, arsine, germanium hydride, and boron hydride.” The *Aitchison* patent provides semiconductor processes “use large amounts of a variety of process gases” and “the exhaust gas from the semiconductor process (which typically is a gas mixture) typically contains a substantial amount of unreacted process gases.” (Col. 1, ll. 15-22). The *Aitchison* patent provides a method and apparatus for treating exhaust gas from a semiconductor processes. (Col. 3, line 66 – Col. 4, line 1) The *Shiban* patent describes that a typical CVD exhaust will have some amount of one or more pyrophoric gases, such as, silane, dichlorosilane, trichlorosilane, or others. (Col. 4, ll. 27-31). All of this is well known by those skilled in the relevant art.

For at least the foregoing reasons, Applicant respectfully submits that exhaust gases, including carrier gases and dopant gases of a manufacturing process, are well known in the art and would enable one of ordinary skill in the art to use the invention to the broadest scope of the claims. Accordingly, Applicant respectfully requests that the Examiner withdraw the present rejection.

Page 7 of 11

Law Offices of
Downs Rachlin Martin PLLC
199 Main Street, P.O. Box 190
Burlington, VT 05402-0190
(802) 863-2375

Application Serial No.: 10/780,341
Attorney Docket No.: BUR920000061US1

Claims 26-34 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Office Action states that the claims contain subject matter that was not described in the specification in such a way to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Applicant respectfully disagrees.

As noted above, Applicant has amended claims 26, 27 and 30 to remove the "n-type" limitation in front of the occurrences of "dopant gas" and has amended claim 26 to remove the "silicon" limitation.

Applicant asserts that the breadth of independent claim 26, as amended, is within the scope of the invention disclosed on the filing date of the parent of the current application. As discussed above, those skilled in the art will readily understand that the silane/arsine combination is merely an example of a carrier gas/dopant gas combination. This is so because skilled artisans routinely work with many other carrier gas/dopant gas combinations in various types of manufacturing processes.

Since those skilled in the art would understand the broad scope of amended independent claim 26, and claims 27-34 that depend therefrom, from the original patent application, these claims cannot fail to meet the written description requirement. Therefore, Applicant respectfully requests that the Examiner withdraw this rejection.

Rejections Under 35 U.S.C. § 102

Claims 19, 20 and 25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,928,426 to *Aitchison* ("the *Aitchison* patent"). Applicant respectfully disagrees.

Independent claim 19, as amended, requires "a chamber having a length and a central axis running along said length and containing a plurality of substrates spaced from one another along said length and oriented substantially perpendicular to said central axis." In contrast, the *Aitchison* patent requires a plurality of substantially parallel plates that are oriented parallel to the central axis of the chamber. See Col. 2, ll. 42-44 and FIGS. 2, 3 and 4. Indeed, *Aitchison* describes only plates, walls of honeycomb cells and strips that are parallel to the central axis of the chamber. There is no mention whatsoever that these members can be perpendicular to the

Page 8 of 11

Law Offices of
Downs Rachlin Martin PLLC
199 Main Street, P.O. Box 190
Burlington, VT 05402-0190
(802) 863-2375

Application Serial No.: 10/780,341
Attorney Docket No.: BUR920000061US1

central axis. Without any such mention, it cannot be reasonably asserted that *Aitchison* discloses substrates perpendicular to the central axis of the chamber.

Consequently, Applicant respectfully submits the *Aitchison* patent teaches away from "a plurality of substrates spaced from one another along said length and oriented substantially perpendicular to said central axis" of the chamber, as required in amended claim 19.

For at least the foregoing reasons, Applicant respectfully submits the *Aitchison* patent cannot reasonably be said to anticipate the method of amended independent claim 19. Accordingly, Applicant respectfully requests that the Examiner withdraw the present rejection of this claim, and claims 20 and 25 that depend therefrom.

Rejections Under 35 U.S.C. § 103

Aitchison

Claims 21 and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the *Aitchison* patent.

The *Aitchison* patent is as described above relative to the anticipation rejection. Claims 21 and 22 depend from amended independent claim 19, which as discussed above, is not anticipated by the *Aitchison* patent. Therefore, claims 21 and 22 cannot be obvious in view of the *Aitchison* patent. Accordingly, Applicant respectfully requests that the Examiner withdraw the present rejection.

Aitchison and Taylor

Claims 19, 23 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,945,078 to *Taylor* ("the *Taylor* patent") in view of the *Aitchison* patent. Applicant respectfully disagrees.

The method of amended claim 19 requires "a chamber having a length and a central axis running along said length and containing a plurality of substrates spaced from one another along said length and oriented substantially perpendicular to said central axis." As provided above, the *Aitchison* patent teaches away from at least one substrate substantially perpendicular to the central axis and along the length of the chamber, as required by amended independent claim 19.

Additionally, as the Office Action concedes, the *Taylor* patent "does not teach flowing the exhaust gas through an enclosure defining a chamber and containing at least one substrate

Page 9 of 11

Law Offices of
Downs Rachlin Martin PLLC
199 Main Street, P.O. Box 190
Burlington, VT 05402-0190
(802) 863-2375

Application Serial No.: 10/780,341
Attorney Docket No.: BUR920000061US1

which baffles the exhaust gas therefore increasing the residence time of the gas in the chamber and causing the first chemical component to be chemical vapor deposited onto the substrate as required by claim 19.”

Since the *Aitchison* and *Taylor* patents do not disclose or suggest, either alone or in combination with one another, the subject matter of amended independent claim 19, they cannot render obvious claims 23 and 24 that depend therefrom. Therefore, Applicant respectfully requests that the Examiner withdraw the rejection of claims 23 and 24.

Shiban and Aitchison

Claims 19 and 27-34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,271,908 to *Shiban* et al. (“the *Shiban* patent”) in view of the *Aitchison* patent. Applicant respectfully disagrees.

Applicant respectfully submits that there is no motivation or suggestion to combine the *Shiban* and *Aitchison* patents. The *Shiban* patent discloses a pyrophoric gas neutralization chamber for oxidizing a stream of process exhaust gas. *Shiban* utilizes baffles to provide turbulence that mixes the gas with oxygen to inhibit explosions and to facilitate the oxidation process. In contrast, the *Aitchison* patent provides parallel heated plates collecting product from a high temperature CVD reaction as the gas flows parallel to the plates in what appears to be substantially non-turbulent flow. Because of these diametrically opposed modes of operation, Applicant respectfully submits there is no motivation or suggestion to combine the turbulent flow of the *Shiban* patent with the substantially non-turbulent flow of the *Aitchison* patent. In addition, there is no motivation or suggestion to modify the *Shiban* complete oxidation device to have any of the features of the *Aitchison* device. These are two devices that remove materials from exhaust gas in two completely different ways that are not compatible with one another.

Indeed, Applicant asserts that such modifications would change the principle operation of the two devices. A combination that results in such a modification is not permitted under the rules. See MPEP 2143.01 subsection VI “If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)).

Page 10 of 11

Law Offices of
Downs Rachlin Martin PLLC
199 Main Street, P.O. Box 190
Burlington, VT 05402-0190
(802) 863-2375

Application Serial No.: 10/780,341
Attorney Docket No.: BUR920000061US1

For at least this reason, Applicant respectfully requests that the Examiner withdraw the present rejection with respect to amended independent claims 19, and claims 27-34 that depend therefrom.

CONCLUSION

Applicant submits that claims 19-30, 32-35, 37 and 38, as amended, are in condition for allowance. Therefore, prompt issuance of a Notice of Allowance is respectfully solicited. If any issues remain, the Examiner is encouraged to call the undersigned attorney at the number listed below.

Respectfully submitted,

INTERNATIONAL BUSINESS MACHINES
CORPORATION

By: Norman S. Yi
Norman S. Yi
Registration No.: 58,268
DOWNS RACHLIN MARTIN PLLC
Tel: (802) 863-8368
Attorneys for Assignee

BTv.530210.04

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.